Attorney Docket No. 98731-000001/US

IN THE U.S. PATENT AND TRADEMARK OFFICE

APPLICANT(S):	HACKMAN et al.	CONF. NO.:	4019
APPL. NO.:	10/689,951	ART UNIT:	3744
FILED:	October 22, 2002	EXAMINER(S):	M.M. ALI
ENTITLED:	AUTOMATIC LN2 DISTRIBUTION SYSTEM FOR HIGH-PURITY GERMANIUM MULTI-DETECTOR FACILITIES		

APPLICANTS' APPEAL BRIEF PURSUANT TO 37 C.F.R. § 41

January 3, 2006

December 31 = Saturday
January 2 = Federal Holiday

M/S APPEAL BRIEF - PATENTS
Commissioner for Patents
Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellants submit the following:

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I. Real Party in Interest - 37 C.F.R. § 41.37(c)(1)(i)

The real party in interest in this appeal is TRIUMF, operating as a joint venture by The Governors of The University of Alberta, the University of British Columbia, Carleton University, Simon Fraser University, The University of Toronto, and The University of Victoria. Assignment of the application was submitted to the U.S. Patent and Trademark Office on October 22, 2003, and recorded on the same date at Reel 014622, Frame 0124 *et seq.*

II. Related Appeals and Interferences - 37 C.F.R. § 41.37(c)(1)(ii)

There are no known appeals or interferences that will affect, be directly affected by, or have a bearing on the Board's decision in this Appeal.

III. Status of the Claims - 37 C.F.R. § 41.37(c)(1)(iii)

Claims 1-16 are pending in the application, with claims 1, 10 and 11 being written in independent form.

Claims 1-16 remain finally rejected with claims 15-16 being objected to as depending from a rejected claim.

Claims 1-14 on appeal are set forth in the Claims Appendix attached below.

IV. Status of Amendments - 37 C.F.R. § 41.37(c)(1)(iv)

The requested entry of new claims 17 and 18 requested in the Response Under 37 C.F.R. § 1.116 filed July 28, 2005, was denied as indicated in the Advisory Action dated September 7, 2005. No other amendments to the claims were requested subsequent to the final rejection in the Office Action dated May 24, 2005.

V. Summary of Claimed Subject Matter - 37 C.F.R. § 41.37(c)(1)(v)

A. Claim 1

With reference to the example, non-limiting embodiments depicted in FIGS. 3, 6 and 7 (reproduced below) and the corresponding text of the specification at paragraphs [0015-18], with regard to the distribution system, and paragraphs [0028-30], with regard to the sensor, claim 1 defines a cryogenic fluid distribution device including a fluid flow passage 212 for distributing cryogenic fluid to an apparatus 100, an overflow passage positioned downstream of the apparatus, and a sensor 304 coupled to the overflow passage, the sensor having an active component 608 for determining if fluid is present in the overflow passage.

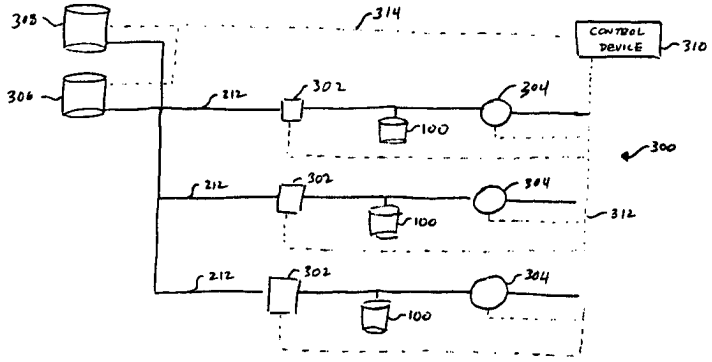


FIG. 3

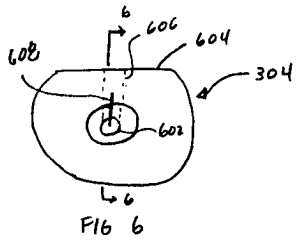


FIG 6

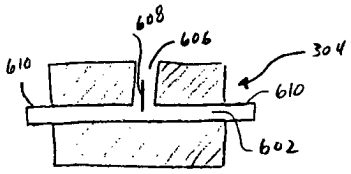


FIG. 7

B. Claim 10

With reference to the example, non-limiting embodiments depicted in FIGS. 3, 6 and 7 (reproduced above) and the corresponding text, claim 10 defines a method of controlling fluid flow to a spectrometer detector element that includes the steps of detecting a presence of fluid within an overflow passage using a sensor with an active sensor element, sending a voltage level signal produced by the active sensor element to a control device, and receiving a signal from the control device for terminating a flow of fluid to the detector element.

C. Claim 11

With reference to the example, non-limiting embodiments depicted in FIGS. 3, 6 and 7 (reproduced above) and the corresponding text, claim 11 defines an apparatus for distributing cryogenic liquid to a cooled device 100, that includes a cryogenic liquid reservoir 306, 308

having an inlet and an outlet, a cooled device having an inlet and an outlet, a supply passage connecting the reservoir outlet 212 and the device inlet for delivery of a cryogenic liquid from the reservoir to the device, a valve 302 coupled to the supply passage and operable for controlling a flow of the cryogenic liquid within the supply passage, an overflow passage connected to the device outlet and a sensor 304 coupled to the overflow passage, the sensor having an active component 608 configured for determining if cryogenic liquid is present in the overflow passage.

VI. Grounds of Rejection to be Reviewed on Appeal - 37 C.F.R. § 41.37(c)(1)(vi)

Appellants seek the Board's review of:

1) the rejection of claims 1 and 6-11 and 13-14 under 35 U.S.C. § 102(b) as anticipated by Sillat's German Patent DE 4420621 A1 ("Sillat");

2) the rejection of claims 2 and 12 under 35 U.S.C. § 103(a) as unpatentable over Sillat in view of McCulloch et al.'s U.S. Patent No. 6,016,697 ("McCulloch");

3) the rejection of claims 3 and 4 under 35 U.S.C. § 103(a) as unpatentable over Sillat in view of Maric's U.S. Patent No. 5,142,874 ("Maric"); and

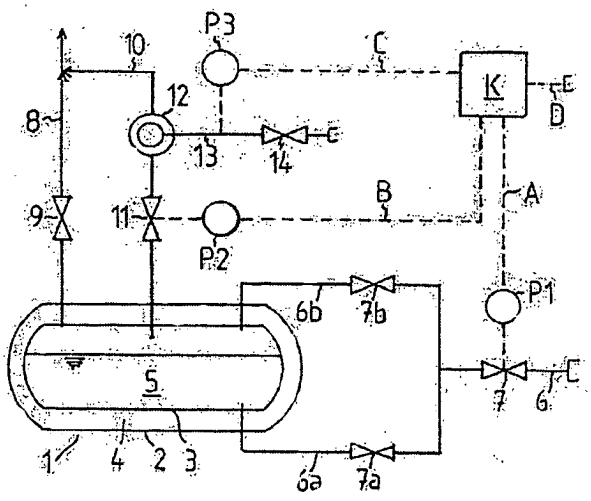
4) the rejection of claim 5 under 35 U.S.C. § 103(a) as unpatentable over Sillat in view of Maric and further in view of McCulloch.

VII. Argument - 37 C.F.R. § 41.37(c)(1)(vii)

A. The Anticipation Rejection of Claims 1, 6-11 and 13-14

As noted above, each of the independent claims of the present application require the presence of, and with regard to the method claim, the use of, a sensor having an "active component" for determining if fluid is in an overflow passage.

The Applicants contend that there is no indication in the translation of Sillat provided by the Examiner or Sillat's FIG. 1 (reproduced below) that any "sensor" including an "active component" is present in line 10.



Indeed, the Applicants contend that, according to Sillat, the Examiner's alleged "sensor" 12 is simply a vessel filled with a gas, such as neon, that will condense when surrounded by cryogenic liquid exiting the container 1, thereby reducing the pressure in line

13 to which it is pneumatically connected. It is this pressure drop that is, in turn, sensed by pneumatic contact manometer P3 at some distance removed from any cryogenic fluid or liquid in line 10 and does not, therefore, determine "if fluid is present in the overflow passage" as recited in claims 1 and 11. Sillat Trans., page 4, lines 31-32. Indeed, Sillat notes that leakage of gas from the reservoir 12 will be produce the same effect as the transition of the flowing medium from gas to liquid. Sillat Trans., page 4, lines 34-36.

The Applicants also suggest that the only potentially "active" component utilized in Sillat in connection with the bypass line is the pressure sensor P3, a sensor which is clearly not "in" bypass line 10. The Applicants also respectfully maintain that there is no pneumatic connection between Sillat's manometer 12 and controller K as suggested by the Examiner. Action at 3.[1]

The Applicants respectfully contend that a fair and reasonable reading of the translation of Sillat provided by the Examiner would not lead one of ordinary skill in the art to conclude that Sillat's paths 8 and 10 shown in Sillat's FIG. 1 are "fluid flow passages" for "distribution" of cryogenic fluid as alleged. Indeed, according to Sillat, the presence of fluid within passage 10 results in the closing of check valves 9 and 11. Sillat Trans., page 4, lines 29-33. Such a result will prevent lines 8 and 10 from being used to distribute any "cryogenic fluid."

The Applicants also respectfully maintain that the Examiner has not identified any textual or logical basis for the professed "belief" with regard to the "active" nature of neon contained in a reservoir. The Applicants submit that the neon does not require any power for operation or produce any output signal and does not, therefore, function as an "active" sensor.

[1] All references to the "Action" are referring to the Office Action dated May 24, 2005.

Indeed, the Applicants are hard pressed to conceive of a more passive element. Accordingly, absent some relevant art-based evidence or logical reasoning to support this belief, the Applicants respectfully contend that the rejections predicated on this "belief" must be withdrawn.

The Applicants respectfully maintain, therefore, that the Examiner has failed to establish with the requisite degree of clarity that Sillat does, in fact, teach "each and every element as set forth in the claim." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Absent the establishment of such a teaching, the present rejection cannot be maintained.

The Applicants respectfully request, therefore, that this rejection be reconsidered and withdrawn accordingly.

B. The Obviousness Rejection of Claims 2 and 12

As detailed above, the Applicants respectfully maintain that, contrary to the Examiner's assertion, it has not been established that Sillat "discloses the invention substantially as claimed." Action at 4. The Applicants also respectfully maintain that the Examiner has persisted in the misinterpretation of the teachings of McCulloch with regard to the function of the cited LEDs, 274, 276 and 278 as suggested by McCulloch's FIG. 6 (reproduced below).

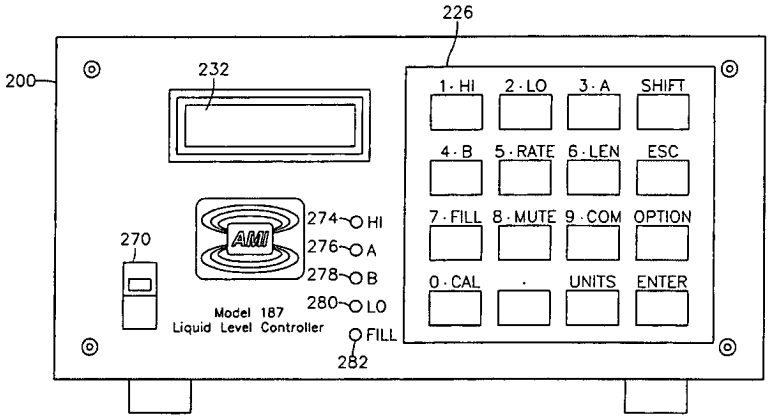


Fig. 6

Indeed, as clearly disclosed by McCulloch, ***these LEDs are simply indicators*** provided on the front of controller 200 and are not used, in any fashion, to ***sense*** (as opposed to indicate) any condition or flow within the distribution lines. As noted previously, McCulloch provides:

> Several ***LEDs are also provided on the front of the controller 200 to indicate the status of various control and alarm setpoints*** which are adjustable through the user interface 226. These setpoints include two alarm setpoints (HI and LO) which define maximum and minimum acceptable liquid levels within the storage tank 100, and two control setpoints (A and B) which define intermediate, or desirable liquid levels used for controlling liquid level 102 automatically through use of a fill valve 402, which is preferably a solenoid-operated valve, and liquid conduit 404 interconnecting the tank 100 with a liquid supply source, or tank 400. ***When the HI alarm setpoint is reached, a HI level LED 274 is illuminated. Likewise, a LO level LED 280 is illuminated when liquid level 102 reaches the LO alarm setpoint. The A level LED 276 illuminates when liquid level 102 reaches that level defined by control setpoint A, and B level LED 278 illuminates when control setpoint B is reached. When setpoint B is reached,*** the microcomputer 222 outputs a signal to the fill valve 402 so that the valve 402 opens to allow liquid to flow from the supply tank 400 to the storage tank 100. When the storage tank 100 has filled to the level defined by setpoint A, the fill valve 402 closes and liquid flow into the storage tank 100 ceases. ***A FILL LED 282 is illuminated to indicate when the solenoid-operated fill valve 402 is open and allowing liquid to flow from supply tank 400 into the tank 100.*** This automatic FILL function provided by the controller 200 can be manually overridden or disabled through the user interface 226.

McCulloch, col. 7, line 47 to col. 8, line 7 (Emphasis added).

The Applicants respectfully maintain, therefore, that McCulloch provides ***no teaching or suggestion*** with regard to either the suitability or manner in which the disclosed ***LED indicators*** could be modified to act as "an active component for determining if fluid or liquid is present in the overflow passage" as required by Applicants' claims 2 and 12.

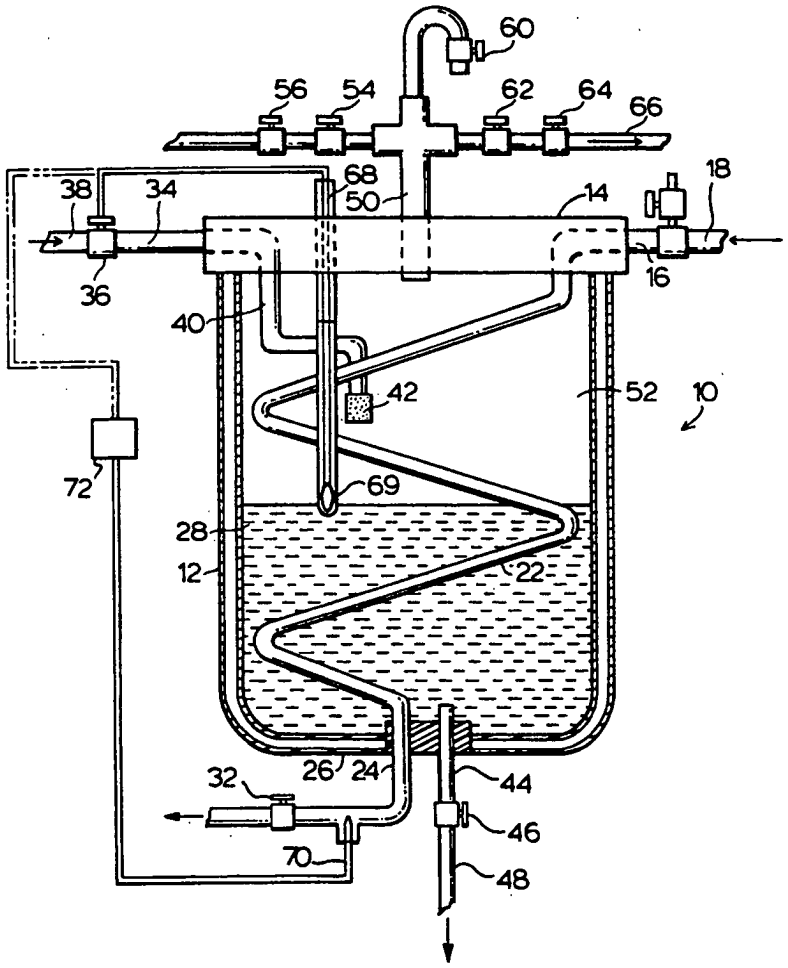
The Applicants respectfully contend, therefore, that the Action has failed to establish that all the claim limitations are taught or suggested by the proposed combination of references and has failed to establish any colorable motivation for making the proposed combination from within those references. The Applicants respectfully maintain, therefore, that the present Action fails to establish a *prima facie* case for the obviousness of the claimed invention, *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974), and that this rejection cannot properly be maintained on the present record.

The Applicants respectfully request, therefore, that this rejection be reconsidered and withdrawn.

C. The Obviousness Rejection of Claims 3 and 4

As detailed above, the Applicants respectfully maintain that, contrary to the Examiner's assertion, it has not been established that Sillat "discloses the invention substantially as claimed." Action at 4. The Applicants also respectfully suggest that the Examiner is misinterpreting the teachings of Maric with respect to the positioning and function of the cited temperature sensor 70 as shown in Maric's FIG. 1 (reproduced below).

FIG. 1



As taught by Maric, temperature sensor 70 is ***not*** positioned in a cryogenic flow passage, but is, instead, arranged in an outlet pipe for sensing the temperature of material, specifically condensate, that has been cooled by exposure to the cryogenic fluid 28 as it passes through a pipe 22 transiting vessel 12 and the cryogenic fluid contained therein. Maric, col. 5, line 66, to col. 6, line 6. Specifically, Maric goes on to state:

> The temperature sensor 70 senses the temperature of the liquid condensate in the outlet 24 from the vessel. The temperature is preset to the optimal temperature for condensation of the vapors being treated in the heat exchanger coil 22 by introduction of the appropriate quantity of cooling medium to the interior of the vessel 10 through pipe 40. During passage of the condensible

> vapor through the coil 22, the interior temperature of the vessel 10 is sensed indirectly by the sensor 70 located in the outlet pipe 24. If the flow rate of condensible gases becomes sufficiently high as to cause a rise in temperature in the condensate, the temperature sensor 70 generates an electrical signal which, via controller 72, opens the solenoid valve 36 to permit further coolant to enter the vessel 10 to restore the internal temperature to the desired level, thereby to restore the temperature of condensate to the desired value. The level controller device 68 is set to its upper extent during the condenser mode and serves to prevent overfilling of the vessel 12 by coolant. In this way, the cryogenic apparatus 10 may control precisely the temperatures required to condense a wide range of vapour distillates.

Maric, col. 6, lines 41-62. The Applicants further suggest that no teaching or suggestion has been identified in Maric that would lead one of ordinary skill to a configuration in which "the active component is positioned within the hole and impinges into the through passage" of a sensor arranged in a cryogenic overflow line as recited in Applicants' claim 4.

The Applicants respectfully contend, therefore, that the Action has failed to establish that all the claim limitations are taught or suggested by the proposed combination of references and has failed to establish any colorable motivation for making the proposed combination from within those references absent inappropriate hindsight guided solely by the Applicants' disclosure. The Applicants respectfully maintain, therefore, that the present Action fails to establish a *prima facie* case for the obviousness of a claimed invention, *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974), and suggests that the present rejection cannot properly be maintained on the present record.

The Applicants respectfully request, therefore, that this rejection be reconsidered and withdrawn.

D. The Obviousness Rejection of Claim 5

As detailed above, the Applicants respectfully maintain that, contrary to the Examiner's assertion and as detailed above, it has not been established that Sillat, Maric or McCulloch, whether considered singly or in combination, can fairly be said to "disclose the invention substantially as claimed." Action at 5. In particular, the Applicants respectfully maintain that no teaching or suggestion has been identified in the applied references that would guide one of ordinary skill in the art to adapt McCulloch's ***LED indicators*** as the active component of a sensor configured as recited in Applicants' claims.

The Applicants respectfully request, therefore, that this rejection be reconsidered and withdrawn.

CONCLUSION

In view of the detailed discussion of the pending rejections and the applied references provided above, the Applicants respectfully submit that the technical bases upon which each of the pending rejections was based have been addressed and overcome, leaving the present application in condition for allowance.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge any underpayment or non-payment of any fees required under 37 C.F.R. §§ 1.16 or 1.17, or credit any overpayment of such fees, to Deposit Account No. 08-0750, including, in particular, extension of time fees.

Respectfully submitted,

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VIII. Claims Appendix - 37 C.F.R. § 41.37(c)(1)(viii)

The claims involved in this appeal are:

1. A cryogenic fluid distribution device, comprising:

a fluid flow passage for distributing cryogenic fluid to an apparatus;

an overflow passage positioned downstream of the apparatus; and

a sensor coupled to the overflow passage, the sensor having an active component for determining if fluid is present in the overflow passage.

2. The device according to claim 1, wherein the active component is a light emitting diode.

3. The device according to claim 1, wherein the sensor includes a body having a through passage therein defining a flow area for fluid, the sensor further including a hole intersecting with the through passage.

4. The device according to claim 3, wherein the active component is positioned within the hole and impinges into the through passage.

5. The device according to claim 4, wherein the active component is a light emitting diode.

6. The device according to claim 1, further comprising a control device coupled to the sensor, the control device capable of receiving a signal from the sensor indicating a presence of liquid in the overflow passage and further capable of controlling a fluid flow within the fluid flow passage.

7. The device according to claim 6, wherein the control device controls fluid flow within the fluid flow passage by way of a valve coupled to the fluid flow passage.

8. The device according claim 7, wherein the control device outputs a control signal used to toggle the value to a closed, the valve thereby preventing fluid from flowing within the fluid flow passage.

9. The device according to claim 6, wherein the signal from the sensor is a voltage signal.

10. A method of controlling fluid flow to a spectrometer detector element, comprising:

detecting a presence of fluid within an overflow passage using a sensor having an active sensor element associated therewith;

sending a voltage level signal produced by the active sensor element to a control device; and

receiving a signal from the control device for terminating a flow of fluid to the detector element.

11. An apparatus for distributing cryogenic liquid to a cooled device, comprising:

a cryogenic liquid reservoir having an inlet and an outlet;

a cooled device having an inlet and an outlet;

a supply passage connecting the reservoir outlet and the device inlet for delivery of a cryogenic liquid from the reservoir to the device;

a valve coupled to the supply passage and operable for controlling a flow of the cryogenic liquid within the supply passage;

an overflow passage connected to the device outlet; and

a sensor coupled to the overflow passage, the sensor having an active component configured for determining if cryogenic liquid is present in the overflow passage.

12. The apparatus according to claim 11, wherein:

the active component is a light emitting diode.

13. The apparatus according to claim 11, wherein:

the sensor includes

a sensor body, the sensor body being configured to define a fluid flow path through the sensor body; and

a recess opening into the fluid flow path.

14. The apparatus according to claim 13, wherein:

the active component is positioned within the recess.

* * * * *

END OF LISTING OF CLAIMS

IX. Evidence Appendix - 37 C.F.R. § 41.37(c)(1)(ix)

1. Annotated translation of Sillat's German Patent DE 44 20 621 A1 provided by the Examiner (attached hereto)

* * * * *

X. Related Proceedings Appendix - 37 C.F.R. § 41.37(c)(1)(x)

NONE

* *

PTO 2005-3443

German Patent No. 44 20 621 A1

METHOD FOR PROTECTING AGAINST OVERFLOW WHEN FILLING A STORAGE CONTAINER

Diethard Sillat

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D. C. MAY 2005
TRANSLATED BY THE RALPH MCELROY TRANSLATION COMPANY

FEDERAL REPUBLIC OF GERMANY
GERMAN PATENT OFFICE
PATENT NO. 44 20 621 A1

Int. Cl.[5]:	F 17 C 6/00
Filing No.:	P 44 20 621.6
Filing Date:	June 13, 1994
Date Laid-open to Public Inspection:	December 22, 1994
Priority	
Date:	June 15, 1993
Country:	Germany
No.:	43 19 722.1

METHOD FOR PROTECTING AGAINST OVERFLOW WHEN FILLING A STORAGE CONTAINER

[Verfahren zum überlaufsicheren Befüllen eines Speicherbehälters]

Inventor: Diethard Sillat

Applicant: Linde AG

The following information has been taken [unedited] from documents submitted by the applicant

The invention relates to a method for protecting against overflow when filling a storage container for cryogenic media, especially a vacuum-insulated Kfz [passenger vehicle] storage container or an upright storage container for liquid hydrogen, wherein the storage container has at least one gauge tubular line and one filling line each with at least one pneumatic check valve.

In the following, for labeling special cryogenic media according to its aggregate state, the letters "G" for "gaseous" and "L" for "liquid" are appended as prefixes, e.g., GH_2 and LH_2, respectively, for gaseous and liquid hydrogen.

In particular, hydrogen is currently gaining increasing importance as an energy carrier due to rising energy demands and increasing awareness of environmental concerns. Thus, initial trials are under way for powering airplanes, trucks, busses, and also passenger cars by means of turbines or engines powered with hydrogen. Here, the storage of hydrogen in liquid form "on

board" the above transportation means is the most useful. For this purpose, the hydrogen does have to be cooled to approximately 25 K and kept at this temperature, which can be achieved only through corresponding insulating measures on the storage containers or tanks. As a rule, based on the low density of GH_2, storage in a gaseous state is unfavorable in the above transportation means due to weight reasons. Due to safety-related reasons, special safety measures are required in hydrogen-powered vehicles. However, these special measures will not be discussed in more detail here. The necessary insulation for the storage container is used here not just for maintaining the temperature within the storage container. An overview of the current state of hydrogen developments in terms of its use as a fuel is given in, e.g., the article "Liquid hydrogen as the motor fuel of the future," Dr. W. Peschka, offprint from "Maschinenwelt-Elektrotechnik [Machine world - electrotechnology]," Vol. 43, No. 8/9-1988 and "Liquid Hydrogen Fueled Automobiles: On-Board and Stationary Cryogenic Installations," R. Ewald, Cryogenics 1990, Vol. 30, September supplement.

In particular, the filling or refueling procedure for the transportation means mentioned above currently appears to represent one of the reasons for the only hesitant acceptance of the "hydrogen" energy carrier due to the lengthiness of the procedure as well as the dangers associated with it. Obviously, the same considerations, especially with reference to the dangers during the filling or refueling procedure, also apply to upright storage containers.

In the filling or refueling procedures, a special task is given to the overflow control; this is particularly relevant if the media overflowing the storage container could lead to an explosive mixture with the surrounding air and thus could inflict injury to the operating personnel and damage to material assets. For this reason, methods and devices for the filling level control of storage containers have already been known for a long time. In DE-OS 23 45 112, e.g., a device for the filling state control of a storage container for supercooled liquid gasses is described. Here, the storage container has a control tube, which projects into the interior of the storage container and whose highest point is at the same level as the filling level to be controlled. The control tube is connected to a display vessel outside of the storage container. Here, the display of the filling level to be controlled happens such that a small amount of liquid gas flows from the interior of the storage container into the display vessel, which has the consequence that condensation appears on the outer visible surface of the display vessel when the medium cools to below the dew point or frost appears when the medium cools to below the freezing point. In addition, there is a plurality of other possibilities for limiting the overflow of a storage container, such as, e.g., pressure switches, which use the water-hammer effect of the liquid as a signal for ending the filling procedure hydraulically for a 100% filling of the storage container. This method is naturally unsuitable when a storage container may be filled only to approximately 90%, such as is the case, e.g., in motor vehicles. In addition, other systems with more or less complicated

measurement devices within the storage container are known, whose disadvantage, however, is that they require electrical energy and for this reason must be designed to be explosion-proof. This explosion-proof design of individual components or assemblies, however, leads to a construction that is more expensive and more complicated for the storage container.

The goal and problem of the present invention is to prevent the disadvantages of the state of the art.

This is achieved according to the invention in that the end of the gauge tubular line reaching into the storage container corresponds to the maximum filling height of the storage container and that by means of a measurement device provided in the gauge tubular line, preferably a vapor-pressure contact manometer, the aggregate state of the medium flowing from the storage container is detected while the storage container is being filled and at the moment when the flowing medium transitions from the gaseous state to the liquid state, the pneumatic check valves in the gauge tube and the filling line are closed.

The method according to the invention for protecting against overflow when filling can be operated without electrical auxiliary energy and for this reason does not have to be explosion-proof. When the maximum permitted filling level within the storage container is reached, the check valve in the filling line is automatically closed. A "bypass" of this closing time by the operating personnel is not possible. The pneumatic auxiliary energy needed for closing or opening the check valve is provided either by the filling installation or "gas station" or by the supply vehicle. Electrical auxiliary energy can be similarly provided if necessary.

The selection of the sensor medium that is used depends on the cryogenic medium with which the storage container is filled. Care should be taken in the selection of the sensor medium that the vapor pressure curve of the sensor medium is the same or somewhat higher than that of the cryogenic medium, i.e., the same medium that is filled into the storage container can also be used as the sensor medium.

One configuration of the method according to the invention is characterized in that the medium flowing from the storage container (1) is heated indirectly with surrounding air before the sensor of the vapor pressure contact manometer (12).

By means of this configuration of the method according to the invention, the moment when the medium flowing from the storage container transitions from the gaseous phase to the liquid phase can be better distinguished or identified. Furthermore, with this configuration, the installation of an additional heating device can be eliminated. The invention and also other configurations thereof are explained with reference to the figure.

The figure shows a storage container 1 comprising an outer container 2 and an inner container 3, between which, as a rule, an insulator 4 is arranged. The cryogenic medium 5 to be stored is located within the storage container 1. The filling line 6 is divided into a lower filling

line 6a and an upper filling line 6b. The filling line 6 can be blocked by means of the valve 7; other check valves 7a and 7b are arranged in the lines 6a and 6b. The storage container 1 further has an exhaust gas line 8, which is provided with a check valve 9. In the gauge tubular line 10 leading from the storage container 1, a vapor pressure contact manometer 12 is arranged after the check valve 11. The necessary sensor medium, preferably neon in the case of a hydrogen storage container, is connected to the vapor pressure contact manometer 12 via the line 13. The valve 14 can be opened for filling the line 13 and the vapor pressure contact manometer 12 with neon. The line 13 is connected to a pneumatic or electric contact manometer P3. The check valves 7 and 11 are provided with pneumatic drives P1 and P2. Both the contact manometer P3 and also the pneumatic drives P1 and P2 are in turn connected via the pneumatic lines A, B, and C shown with dashed lines to a control unit K, wherein C can also be an electric line. The dashed lines A and B represent the pressure lines for switching the corresponding check valves. The dashed line C can be a pneumatic or electric signal line. Via the dashed line D, the control unit K is supplied with the pneumatic auxiliary energy either from the filling station or from the tanker vehicle. If the storage container 1 is provided, e.g., in a motor vehicle, then the control unit K is mounted as a rule in the filling station and the pneumatic auxiliary energy needed for switching the check valves is provided via the line D from the filling station or "gas station." In the case of an upright storage container, the necessary pneumatic auxiliary energy is provided by the tanker vehicle refueling the upright storage container.

At the beginning of a filling procedure, both the filling line 6 and also the auxiliary energy line D are connected to the filling station or to the tanker vehicle by the operating personnel. At this time, the check valves 7 and 11 are closed. Now, via the pneumatic control unit K, first the check valve 11 is opened and then the valve 7 of the filling line 6 [is opened]. The storage container 1 is now filled with the cryogenic medium. Here, whether the branch line 6a or 6b or both branch lines are used depends on how great the pressure of the cryogenic medium 5 still remaining in the storage container 1 is. During the filling procedure, gaseous medium, which is displaced from the inner container 3 of the storage container 1 by the inflowing medium, flows out through the line 10 and the sensor of the vapor pressure contact manometer 12. The transition from a gaseous medium flowing in the gauge tubular line 10 to a liquid medium creates a temperature drop within the line 10 and the sensor of the vapor pressure contact manometer 12. This causes the sensor medium to condense and leads to a pressure drop, which is registered by the pneumatic contact manometer P3. Then the closing of the check valves 7 and 11 is triggered by the control unit K, so that the filling procedure is interrupted or ended.

Should leakage occur in the vapor pressure contact manometer 12, this would have the same effect as when the flowing medium transitions from the gaseous state to the liquid state, namely a pressure drop of the sensor medium and thus an automatic closing of the check valves

7 and 11. The same effect occurs if the pneumatic auxiliary energy is lost, because then the check valves are automatically closed by means of springs, which had previously been biased by the auxiliary energy.

Claims

1. Method for protecting against overflow when filling a storage container for cryogenic media, especially of a vacuum-insulated Kfz [passenger vehicle] storage container or an upright storage container for liquid hydrogen, wherein the storage container has at least one gauge tubular line and one filling line each with at least one pneumatic check valve, characterized in that the end of the gauge tubular line (10) reaching into the storage container (1) corresponds to the maximum filling height of the storage container and that by means of a measurement device provided in the gauge tubular line, preferably a vapor pressure contact manometer (12), the aggregate state of the medium flowing out of the storage container (1) during the filling of the storage container (1) is detected and at the moment when the flowing medium transitions from the gaseous state to the liquid state, the pneumatic check valves (7, 11) in the gauge tubular line (10) and in the filling line (6) are closed.

2. Method according to Claim 1, characterized in that the medium flowing from the storage container (1) is heated indirectly with surrounding air before [reaching] the sensor of the vapor pressure contact manometer (12).

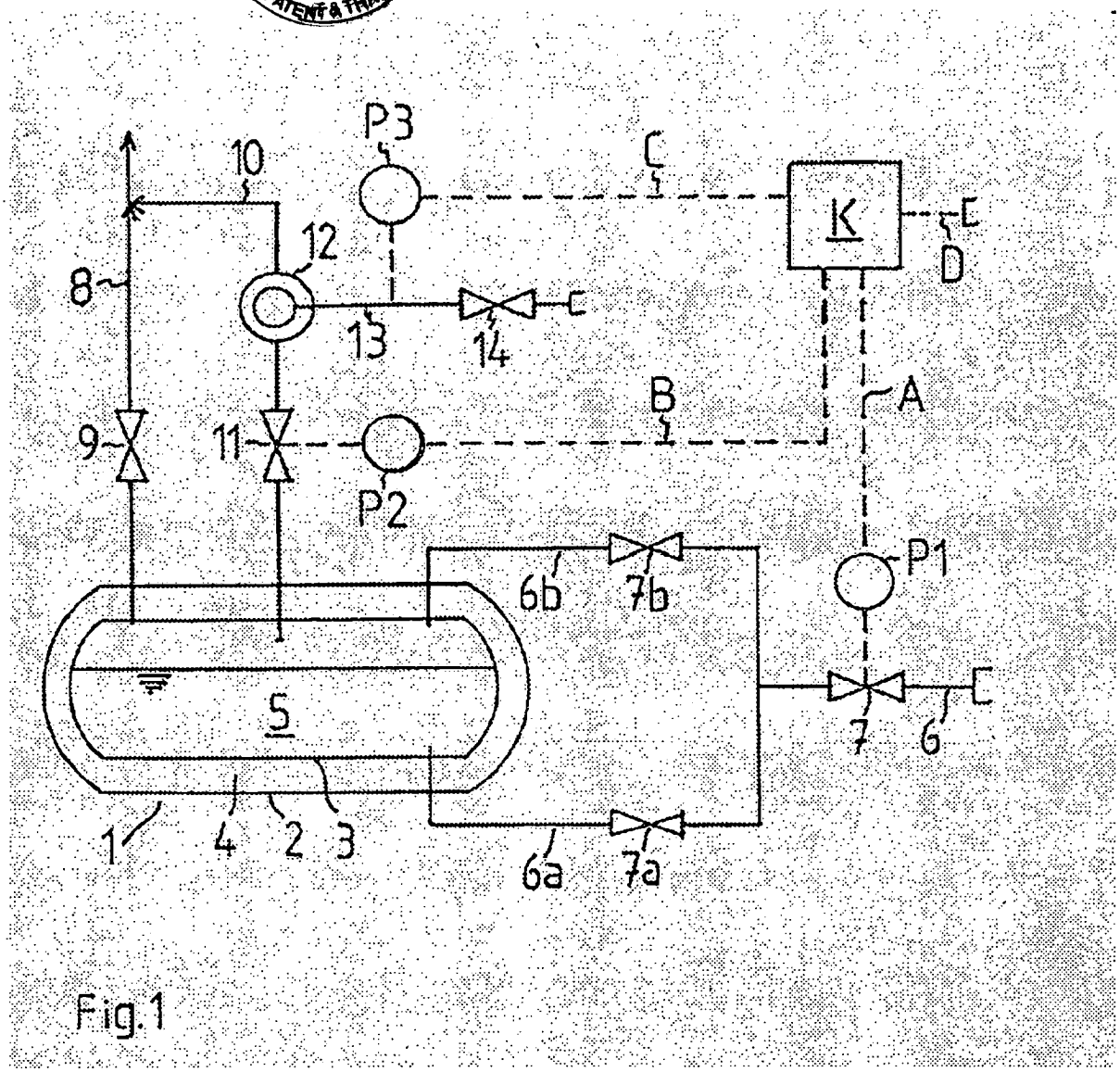

Fig.1

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